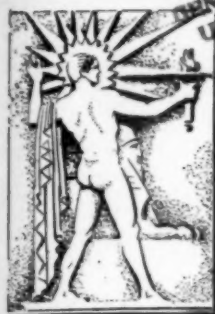


EUROPEAN

TRAVEL

NUMBER



SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION



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April 7, 1928



LONGITUDE 0° 00' 00"

The Royal Observatory at Greenwich

(See page 223)

Vol. XIII

No. 365

Museums in Europe

General Science

Museums are so well listed in the guide-books, such as the Baedekers, Muirhead guides and the books published locally for each large city, that it is not believed worth while to present mere lists of science museums.

The thorough scientific traveler may wish to check through the new edition of "Minerva," the German compendium of intellectual institutions, and discover collections and places that would otherwise be missed. The "Minerva" lists are also particularly good for universities. German museums are listed and described in the "Jahrbuch der Deutschen Museen" by Albert Schramm, published in Leipzig. The International Office of Museums, with headquarters in the Palais Royal, Paris, is publishing a series of directories of continental museums, most of art.

The leading industrial museums of Europe, catalogs and pamphlets upon which may be found in the library of the Museums of the Peaceful Arts, 24 West 40th St., New York City, are as follows:

Conservatoire des Arts et Metiers, Paris, France.

Deutsches Museum, Munich, Germany.

Technisches Museum für Gewerbe und Industrie, Vienna, Austria.

Science Museum, London, England.

Science News-Letter, April 7, 1928

INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable topography and the most convenient arrangement.

Each article is automatically indexed by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

Each article is automatically dated by its last line.

An extra supply of this issue and next week's American Travel Number of the Science News-Letter are provided so that you can send copies to your friends who are planning vacation trips. Send 30 cents (in stamps if you wish) and a memorandum of name and address.

IN these tourist cabin days, a considerable portion of America emigrates each year for a few weeks in Europe. To aid the scientifically inclined traveler to make the most of his trip, this European travel issue of the SCIENCE NEWS-LETTER has been prepared. It is not a complete guide to scientific Europe. It is more nearly a few notes and addresses such as a friend of yours might give you as his contribution to the happiness of your stay in an unknown city.

Realizing the shortcomings in the scope, detail and arrangement of this memorandum guide, we solicit every reader to contribute suggestions and information. If you visit any scientific place of interest we suggest that you record the facts for the travel files of Science Service and the 1929 travel issues of the SCIENCE NEWS-LETTER.

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Archæological Museums

Anthropology and Archaeology

List prepared by Dr. George Grant MacCurdy of Yale University.

ENGLAND—London: British Museum, Bloomsbury; Museum of Natural History, South Kensington; Wellcome Historical Medical Museum, 54 A Wigmore Street; Bryant & May Museum of Fire-making Appliances. Cambridge: Museum of Ethnology. Dorchester: Dorset Museum. Ipswich: Natural History Museum. Oxford: Pitt Rivers Museum; Ashmolean Museum.

FRANCE—Paris: Museum d'Histoire naturelle; Institut de Paleontologie Humaine. St. Germain-en-Laye: Musée des Antiquités Nationales. Périgueux: Musée Archéologique. Toulouse: St. Raymond Museum; Musée d'Histoire naturelle.

GERMANY—Berlin: Museum für Völkerkunde. Bonn: Provinzial Museum. Cologne: Städtisches Museum für Ur- und Frühgeschichte. Dresden: Museum für Mineral. Geol. und Vorgeschichte. Halle: Provinzial Museum Hannover: Provinzial Museum. Mainz: Römisch-Germanisches Museum. Tübingen: Urgeschichtliches Forschungsinstitut. Weimar: Städtisches Museum.

AUSTRIA—Vienna: Naturhistorisches Museum.

BELGIUM—Brussels: Musée d'Histoire Naturelle; Musée Cinquantenaire.

BULGARIA—Sofia: National Museum.

CZECHOSLOVAKIA—Prague: National Museum. Brno: Moravské Zemské Museum.

DENMARK—Copenhagen: National Museum.

ITALY—Rome: Museo Preistorico e etnografico. Florence: Museo Nazionale di Antropologia e etnologia.

JUGOSLAVIA—Belgrade: Museum of Archeology.

HOLLAND—Haarlem: Teyler Museum. Leiden: Tevaren Museum.

HUNGARY—Budapest: National Museum.

MONACO—Musée Anthropologique.

NORWAY—Oslo: Historical Museum.

POLAND—Lemberg (Lwow): Musée Drieduszycki. Cracow: Musée archéologique de l'Académie des Sciences.

SPAIN—Madrid: Museo Antropologico; Museo Arqueologico.

SWITZERLAND—Bâle: Natural History Museum. Berne: Historisches Museum. St. Gallen: Heimatmuseum; Historisches Museum. Zurich: Landes Museum.

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The Science of an Ocean Voyage

Hydrography

Prepared with the cooperation of the Hydrographic Office, U. S. Navy.

To the science teacher or student, bound for Europe with the idea of visiting places of scientific interest, the ocean voyage might seem rather uneventful, and merely a necessary evil to be endured before the real part of the trip commences. But astronomy, physics, zoology and even chemistry have their part in an ocean trip.

Of unfailing interest on the boat is the daily posting of the ship's position, from which the passengers can see where the boat is, and the path it took in getting there. In the early summer months this route, if one sails from New York, is usually due east to a point at $40^{\circ} 30'$ north latitude and 47° west longitude, the place that navigators call the "corner of the North Atlantic." Out to this point the path is what is called a rhumb line, that is, it is a straight line on a map on the Mercator projection. From the "corner," the ship appears, on the map, to sail in a curve to the northwards. Actually, however, the path is that of a great circle, which is the shortest distance between two points on the surface of a sphere.

We all remember Lindbergh's path to Paris, which was along a great circle, and crossed Nova Scotia, though on the ordinary map it appears most circuitous. If he had flown high enough, over New York, and if his eyes had been good enough, he would have seen Paris in the distance, and then, if he had headed straight for Paris, he would have flown over the path that he actually took.

It might seem that a ship should follow as closely as possible this same path, just skirting Nova Scotia. This would be the shortest route across the Atlantic, but it would take the ship over the Grand Banks, which is an area of shoals. The water here is under a hundred fathoms, or 600 feet, deep, and fogs and ice are frequent. Hence the path actually used is taken. The route passes south of the southern tip, called the "Tail," of the Grand Banks. Incidentally, hydrographers have selected a hundred fathoms as the depth at which "coastal" waters cease and "ocean" waters commence.

The ocean currents are also a source of interest, especially that most famous of all currents, the



"SHOOTING THE SUN" in mid-Atlantic to determine a ship's position

Gulf Stream. At about 150 miles out from New York the influence of the stream is felt. Sometimes there is even a rather well defined line of demarcation between the green cold water, at a temperature of perhaps 60 degrees F. and the warm waters, of a deep blue color, and perhaps 80 degrees F. From then on the ship continues in the Gulf Stream the rest of the way across.

Meteorologically, the early summer months are the most uneventful of the year. Gales are at a minimum, and though they may, and do, occur, they lack the intensity of those encountered later. Another thing to notice are the favorable winds that usually accompany the voyage over. This is the result of the Atlantic high, a high pressure that is centered at approximately the Azores. Around a high pressure area in the northern hemisphere the winds move in a clockwise direction. That is, north of the high, east is their prevailing direction, while to the south it is to the west, and it is to the north of the high that the ship travels.

It is possible that the summer tourist may see an iceberg, but it is rather unlikely, because south of the Grand Banks ice is not very common in the summer time. However, if one should sail from Montreal or Quebec, and emerge to the Atlantic at Belle Isle, he should be able to see all the ice he wants.

If ever one felt a debt of gratitude to the astronomer, the ocean traveller should experience it. Navigation itself is essentially an astronomical problem. Also, all the

methods depend upon correct time of the ship's chronometer, which can be set from radio time signals. Here also, the astronomer plays his part, for the time is determined at observatories on land.

Every clear day, about noon, the passengers will see one of the ship's officers on the bridge with the sextant, getting the altitude of the sun above the horizon. From this can be determined the ship's latitude. Or again, the officer may be noticed taking sextant observations at dawn or twilight, when a few of the brighter stars and the horizon are both visible. By taking the positions of three heavenly objects practically simultaneously, a precise "fix" can be obtained. Details of this method will be found in any good astronomical text-book.

Though social diversions are apt to occupy a large part of the passenger's time in the evening, and keep him in the salon, he should not forget to watch the stars at least occasionally. Being far away from the lights of a great city, mid-ocean is really a pretty good place to observe the constellations, even though the large amount of moisture in the air prevents the observer seeing stars as faint as he could see from a California mountain, for example.

After turning the "corner of the Atlantic" the ship goes northward rather rapidly, and this is shown in the sky. It is especially evident if the passenger watches the Pole Star on successive nights of the voyage, and notices how it seems to climb higher and higher as he approaches England, which is about ten degrees of latitude farther north than New York. This means that the Pole Star will appear ten degrees higher in the sky from England; while Antares, the brilliant red star in the southern summer evening sky, will appear ten degrees lower. In the course of a few nights, especially on a fast steamer, this change will be very noticeable.

Also with its astronomical aspects is the change in time as the ship travels eastward. When it is noon in New York it is five o'clock in the evening in England, and this means that a total of five hours must be dropped in the voyage over. The time used by the passengers usually changes at midnight, the clocks always being pushed ahead on the eastward voyage. The ship's (Turn to next page)

Europe's Weather Stations

Meteorology

Prepared by U. S. Weather Bureau, Department of Agriculture, Dr. Charles F. Marvin, chief of bureau.

LONDON: Meteorological Office, headquarters of the meteorological service for the British Isles. The administrative offices are at Adastral House, Kingsway. Several other branches, including the library, are in South Kensington. The historic Kew Observatory is a branch of the Meteorological Office. Modern methods of meteorological work in behalf of aviation are illustrated on a large scale at Croydon, the principal British airport.

PARIS: Office National Météorologique, headquarters of the French meteorological service. An important observatory is maintained at Parc Saint-Maur. Paris has also a municipal meteorological service with headquarters at Montsouris.

BRUSSELS: Observatoire Royal, at Uccle, headquarters of the meteorological service of Belgium; also the chief astronomical observatory of the country.

BERLIN: Preussisches Meteorologisches Institut.

LINDENBERG (Kreis Beeskow, Prussia): Aeronautische Observatorium. Famous center of upper-air research and headquarters of the aeronautical weather service of Germany.

HAMBURG: Deutsche Seewarte. Important center of marine meteorology.

VIENNA: Zentralanstalt für Meteorologie und Geodynamik. Headquarters of the meteorological service of Austria.

ROME: Reale Ufficio Centrale de Meteorologia e Geodinamica. Headquarters of the meteorological service of Italy.

TORTOSA, SPAIN: Observatorio del Ebro. Large Jesuit institution devoted especially to the study of relations between solar and terrestrial phenomena.

DAVOS, SWITZERLAND: Physikalisch-Meteorologisches Observatorium. Founded by Dr. C. Dorno. Unique institution devoted especially to the study of the physiological effects of solar radiation, atmospheric electricity, etc.

Central offices of national meteorological services are found in all of the European countries; usually, but not always, at the capital cities.

A general account of meteorological organizations and their work is given in Charles Fitzhugh Talman's "Our Weather" (New York, 1925).

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Voyage—Continued

officers, however, change their time more frequently.

There are plenty of things of scientific interest on the ship itself, such as the various instruments by which the ship is kept constantly under control, and which may be seen if the traveller has enough "pull" to get an introduction to the captain or the officer in charge. Most ships nowadays are equipped with radio finders, with which they can get a bearing from any radio transmitting station, either ashore or afloat.

Many modern ships are equipped with the automatic pilot, by which the human helmsman, who in olden days kept at the wheel, is replaced by a mechanism that keeps the ship in the proper course. Of course, this can only be used in the open sea, where there is no danger of collision with another vessel. "Fathometers," a form of the sonic depth finder, trace on a moving strip of paper a constant record of the depth of the water beneath the ship. Engine revolution counters show the speed of the ship through the water, and are checked near land by the log. It is either thrown over the stern, the common practice on American ships, or else, as on some French vessels, from a boom projecting out over the side from the bridge. Incidentally, if you want to call the sides of the ship right and left, instead of starboard and port, you have a perfect right to do so, for the common appellations have been adopted as official by the U. S. Navy.

A question that often comes up at sea is that of the distance that one can see. From a small boat, such as a life boat, one's horizon would be about 2.5 miles away. However, from a height of 45 feet, that of the promenade deck of a large liner, the horizon would be eight miles away. Another ship equally large could be seen easily when 15 miles distant.

This explains why ships going the other way are rarely encountered, except near port. The west-bound steamer lane, in mid-ocean, is about 60 miles north of the east-bound lane, and though the ships can pass close enough to be in easy touch by radio, they are not likely to be close enough to be visible to each other, unless one is far off the path.

Birds are most likely to be seen near land, though some may follow the ship all the way across. This is particularly true of the storm petrel,

known to the sailors as "Mother Carey's chickens" and to the ornithologist as *Thalassidroma pelagica*. This is a fully descriptive name, for it means "wandering sea-walker." To see these dainty creatures skimming along over the tops of the waves, one realizes how closely it fits. Seagulls also are common.

The waves, by the way, are apt to be a good deal higher than the passenger in the deck chair is apt to realize. From the height of the deck they do not look so large. Actually, even in fine weather, they may be as high as 15 feet from trough to crest. In stormy weather they may easily reach a height of 30 to 45 feet, and be anywhere from 300 to 600 feet long. The highest recorded wave was met by the *Majestic* in December, 1922, its height being 80 feet!

The last evidence of land that the voyager is likely to see will be the Nantucket light ship, or possibly even Ambrose light. Then, as he approaches England, if his destination is Plymouth, Southampton, Cherbourg or Havre, the first evidence of Europe visible will be the Bishop Rock light, on the Scilly Islands, off the southwestern tip of England, which is visible for a distance of 18 miles. It is 148 feet high, and, at night, flashes in groups of two. About 180 miles before reaching this place, the ship reaches the European continental shelf, where the depth of the water is less than 100 fathoms, and where fish abound. From then on, fishing vessels are likely to be seen.

The first lighthouse visible on England proper, if bound for a Channel port, is the Lizard Head light, in Cornwall. If the boat is going to Southampton the famous Eddystone light is also seen. Then, just before sailing up the Solent to Southampton, the Needles light comes into view, and the voyage is practically over.

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Marble used in the Lincoln Memorial at Washington came from the state of Colorado.

A medieval decree forbade the wearing of squirrel fur by persons not of royal blood.

The Japanese beetle in migrating can fly continuously for as much as seven miles.

Oranges can stand a lower temperature than lemons.

Classic Scenes of Science

Prepared by Helen Miles Davis.

The historical associations which saturate famous European towns hold for many travelers as much meaning as the "sights" of the present day so carefully listed in the guide-books. For those who have enjoyed the "Classics of Science," we have prepared this itinerary which takes in places made famous by the work of earlier leaders of scientific thought. The historically-minded will enjoy hunting out relics or mementoes of their favorite heroes.

ENGLAND—While in London biologists and physicians will find it interesting to know that the Royal College of Physicians, chartered and separated from the barbers by Henry VIII in 1518, had among its famous Fellows William Gilbert (1544-1603), author of "De Magnete," and William Harvey (1578-1657), discoverer of the circulation of the blood. *Kensington*, which will attract all scientific visitors by its museums, was the site of one of Faraday's experiments on the magnetism of the

History of Science

earth, and was the home of Newton at the time of his death. *Teddington*, a short distance south of London, not only contains the National Physical Laboratory, but was the home of Stephen Hales, who discovered transpiration of plants and blood pressure of animals. *Colchester*, just north of London, was the home of William Gilbert, the student of magnetism. *Cambridge University* enshrines the memory of many of the greatest British scientists. William Gilbert matriculated there in 1558. William Harvey took his B.A. there in 1597. It was the home of Isaac Newton during a great part of his life. Among objects of interest to scientists are the statue of Newton and the collection of fishes made by Charles Darwin on his voyage on the "Beagle." The industrial towns of *Birmingham* and *Leeds* are not without historical interest. In the former, in the years following 1780, a group of friends used to meet to discuss scientific ideas of the time. Among them were James Watt, Erasmus Darwin and Joseph Priestley.

Priestley's home in Birmingham was burned by a mob in 1791, causing his emigration, a few years later, to Northumberland, *Pennsylvania*, U. S. A. Leeds was a former home of Priestley's, and the place where most of his researches on "airs" were made. Going on up into Scotland, the country of early geologists, we reach Edinburgh. James Nicol studied at the University in 1825, and Hugh Miller made his home in the city from 1839 to 1856. Nicol died in Aberdeen in 1879, having taught in the University there since 1853.

HOLLAND—*Leiden* and *Haarlem* are the cities associated with the late Professor Lorentz. He taught at the University of Leiden from 1878 till his retirement in 1923, during his later years he lived in Haarlem and died there February 4 of this year. Amsterdam University was the residence of Hugo de Vries when his studies of *Oenothera*, the Evening Primrose, were made, and when he discovered Mendel's paper on the (Turn to next page)

Seeing Science in Germany

General Science

In Germany, land of the *Cartels*, where great trusts are tolerated and even encouraged, the economic tendency is reflected by a similar trend toward mergers in science. In Berlin, capital in the economic sense as well as the political, this tendency is especially well developed. Almost every museum, library, research laboratory, observatory, is related in some way to the *Universität*, or to the *Hochschule* (technical colleges), or to one of two or three *Institute* or *Anstalten*. The various points of interest which the scholarly tourist may wish to visit may be in widely separated quarters of the city or even in suburbs at the end of a half-hour's ride, but they all tie in with a central administrative headquarters somewhere.

The University of Berlin, for example, shelters beneath its ample aegis Institutes for Anatomy, Physiology, Neuro-Biology, Pathology, Pharmacology, Radiology, etc., as well as 24 clinics—all as parts of the medical school alone. Then there is the great Museum of Natural History, as a part of the *philosophische Fakultät*, and in the same division are Institutes for Psychology, Archaeology, Chemistry, Physics, Plant Physiology,

Oceanography, and the Botanical Museum. The suburbs accommodate the Botanic Garden (at Berlin-Dahlem), the Astronomical Observatory (Neubabelsburg), and the Meteorological and Geodetic Institutes (Telegraphenberg, near Potsdam). An aeronautic Observatory is maintained at Lindenberg.

Associated with the *Hochschulen* are many collections of technical interest: railroad material, communications, all kinds of building materials, cinematography, and a host of others. Of especial interest to Americans interested in flood control is the *Wasserbau Laboratorium*, or laboratory of hydro-dynamics. The German equivalent of our Bureau of Standards is the *Physikalisch-Technische Reichsanstalt* at Charlottenburg.

At *Munich*, the traveler finds one of the greatest wonders of modern science, the *Deutsches Museum*, which is now only partly completed, though it already contains no less than nine miles of exhibits! In this vast structure one finds exhibits for each brand of science, industry and commerce. Original pieces of ancient and modern historic pieces of apparatus are shown, or else duplicates of them, in size

and material. All of the exhibits capable of so being made are arranged so that the visitor himself may operate them, and observe what happens. Among the most interesting are the original U-boat, Lillenthal's airplane, original pieces of apparatus used by Ampère, Ohm, Hertz and Röntgen, a full size model of a coal mine, full sized locomotives, astronomical telescopes, and the planetarium, described in another article.

Among the most interesting of German scientific organizations are the numerous *Kaiser-Wilhelm-Institute*, which correspond more or less with our Carnegie and Rockefeller Institutions. Each of these *Institute* is organized for a specific purpose, and the ambit of the group is broad: biology, experimental therapy, biochemistry, physical chemistry, brain research, physiology of work, metallurgy, leather research, hydrobiology, bird observatory—to mention only a few. It is easy to see that science and technology are flourishing in post-war Germany, and that the Republic is as able to make its bid for a place in the scientific sun as was the Empire that preceded it.

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Scenes of Science—*Cont'd.*

laws of heredity. He has now retired and is living at *Lunteren*, at the age of 80. Holland must always be associated with Descartes in the minds of lovers of mathematics and philosophy, although one can hardly select a site for honoring his memory. In 21 years of continuous residence in the country he lived in 17 different towns.

SWEDEN—Descartes died in *Stockholm* in 1650. Berzelius made the city one of the fountains of organic chemistry, and Wöhler studied in his laboratory from 1823 to 1825. Arrhenius, who was born at *Wijk* (not a radio station) near *Upsala*, in 1859, did his work on electrolytic dissociation at the University of *Stockholm*, and died in that city last year.

GERMANY—*Berlin* will live in the minds of chemists and physiologists as the home of Wöhler at the time he broke the barriers between their two sciences by his synthesis of urea in 1828. Kirchhoff was professor of physics at the University of *Berlin* from 1875 till his death in 1887. The versatile Helmholtz was born in *Potsdam* in 1821, re-

turned to *Berlin* as professor of physics in the University in 1871, and died in the same city in 1894. *Königsberg*, though off the usual travel routes, is interesting not only as the home of Kant but as the birthplace of Kirchhoff. Helmholtz was professor of physiology at the University in 1849. *Göttingen* was the birthplace and early home of Bunsen (1811-1899), and Wöhler was professor of chemistry there from 1836 till his death in 1882. Those who are attracted to *Frankfurt* by the scientific establishments there will be interested in knowing that Wöhler was born at *Eschersheim*, nearby. *Giessen*, just north of *Frankfurt*, contains the laboratory which Liebig established in 1824, in its day the most famous school of organic chemistry in the world. Not far south of *Frankfurt* is *Heidelberg* University where Bunsen and Kirchhoff invented the spectroscope and made their spectroscopic researches in 1859-60. Bunsen died there in 1899. Wöhler was among its distinguished students, and Helmholtz was for a time professor of physiology there. *Munich* University boasted Liebig as professor of chemistry

from 1852 till his death in 1873.

SWITZERLAND—*Neuchatel* is famous as the home of the geologist and naturalist, Louis Agassiz, and the birthplace of his son, Alexander. From there they emigrated to America in 1846. *Geneva* was the home of Sir Humprey Davy at the time of his death in 1829.

FRANCE—*Strasbourg* University had Pasteur as teacher of chemistry in 1848, at the time he was interested in isomerism. He was professor of chemistry and dean of the faculty of science at the University of *Lille* in 1854, while still a young man. *Paris* is full of scientific associations. Here Descartes did much of his mathematical work. It was the home of Lavoisier, and the great group of chemists and physicists who were his contemporaries. Lavoisier worked at the Academy des Sciences, and was beheaded in the Place de la Concorde. Cuvier announced his system of natural classification of animals in lectures at the *Ecole du Pantheon*. The Pasteur Institute was founded by Pasteur and his fellow-workers in 1888. Pasteur died at his home in *St. Cloud* in 1895. His tomb in *Paris*, though neglected by the guide-books, will be of interest to all scientists. No less interesting is the Radium Institute where Mme. Curie works in her laboratory.

ITALY—Passing from northern to southern Italy, *Como* was the home of Alessandro Volta, discoverer of the electric battery and continuous electric current, who was born there in 1745 and died there in 1827. He was a professor of physics at the University of *Pavia* not far away. *Padua*, on the other side of the Peninsula, has the university where Galileo made his telescope through which he discovered the mountains of the moon, the four moons of Jupiter, the phases of Venus, and other wonders of the skies. At nearly the same time a young Englishman, William Harvey, was studying there for his M. D. He discovered the circulation of the blood after his return to England. *Pisa*, on the western coast, is the site of the cathedral where the inattentive young Galileo discovered the laws of the pendulum, and the Leaning Tower where, in later years, he conducted experiments on the force of gravity. *Florence* was Galileo's home during his later years, and he died at nearby *Arcetri*. In *Rome* the Ministry of Education meets in the room in which he was forced to retract his statement that the earth moves.

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POOL AND EVANS FIRST COURSE IN BOTANY



A well-rounded introduction to the study of plants as related to mankind and as a phase of modern science. The cultural value, and the agricultural and economic importance of the subject are emphasized. Published in January, 1928. Price \$1.64.

EVANS: Laboratory Manual to accompany Pool and Evans's First Course in Botany. Exercises and Illustrations. Price \$0.72.

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Europe's Volcanoes

Geology

Prepared by Dr. Henry S. Washington, Geological Laboratory, Carnegie Institution of Washington.

VESUVIUS—The most accessible and best known volcano in Europe is Vesuvius, near Naples. It is visited easily by taking the Circo-Vesuviano railway (from its special station) and changing cars to the cog-wheel line at Resina. At the top there are guides to show one the way about. When I went down the crater in 1914 it was about 1,200 feet deep, but it has been gradually filling up from the small conelet in the crater floor, so that it is easy to go down the regular, long-established path. The crater is now only about 150 to 200 feet deep. Even if one does not go down, the sight of the cone, which is in a state of almost constant activity, is splendid. There is a good hotel, the "Eremo," at the base of the main cone, and I would advise, if one has the time, to spend the night there and see the volcano all around, walking through the Atrio del Cavallo and the Valle dell'Inferno, between the cone of Vesuvius and the encircling ring of Monte Somma, which is the remnant of the great explosion of 79 A. D., that destroyed Pompeii.

SOLFATARA—Near Naples is also the volcano called Solfatara, near Pozzuoli (take a taxi or tram), about half an hour. It is in a fumarolic condition, and, as I understand, has had a slight eruption recently.

ETNA—In Sicily the volcano is Etna, which is best visited from Catania. (Hotels Grande Bretagne and Bristol, the latter where I always stop). One must take a car to Nicolosi, having previously arranged for guides and horses to the top. The best way to see Etna is to start early in the morning to Nicolosi, have a second breakfast, and reach the "Observatory" about 10 a. m., a long climb horseback over the lava fields. One should spend the night there, seeing the shadow of the cone over the island at sunrise. (Incidentally, it's very cold at the summit, so one must take warm clothes, even in August). Then come down, on foot, through the Val del Bove, to Zafferana, whence one goes back to Catania by car or (I think now) by tram. Or one may return in the same day to Nicolosi, with the car waiting, and so back to Catania.

STROMBOLI, ETC.—Then there are the Aeolian Islands, Lipari, Vulcano, and Stromboli. These involve taking a little steamer (*Turn to next page*)

Information compiled by Prof. Ralph E. Oesper of the University of Cincinnati and used by courtesy of the *Journal of Chemical Education*, Dr. Neil E. Gordon, editor, which this spring will issue a special travel issue giving in greater detail information of interest to chemists with the wanderlust.

LONDON—*University College*: Profs. Donnan, Collie. *Imperial College*: Profs. Thorpe, Baker. *Fuel Institute*: Prof. Bone. These three institutions have well equipped laboratories. *Kensington Museum*: Historical apparatus of Graham, etc. *Royal Institution*: Laboratory of Davy and Faraday—now directed by Bragg, who specializes on crystal structure. *Royal Society*: Newton relics. *National Physical Laboratory*: Teddington. *Library of Chemical Society*: Best chemical collection in existence.

CAMBRIDGE—Prof. Pope, J. J. Thomson, Aston, etc. Good laboratory and typical English college community.

BRUSSELS—*New Technical High School*: Modern laboratories. *Solvay Institute*: Relics of Stas. *Academy of Sciences*: Wonderful assembly hall.

BONN—Prof. Pfeiffer. Kekule's laboratory and grave. Neanderthal skull.

A Chemist's Europe

Chemistry

FRANKFURT A. M.—Profs. Lorenz, Liesegang, V. Braun, Hahn. Modern laboratories.

GIESSEN—Prof. Elbs. The old Liebig laboratory should be seen by every student of organic chemistry.

HEIDELBERG—Prof. Freudenberg. Bunsen's laboratory entirely remodeled. Graves of Bunsen, Victor Meyer, Lossen, etc.

KARLSRUHE—Prof. Bredig, Goldschmidt. Haber's original ammonia apparatus; Hertz laboratory.

FREIBERG, I. B.—Prof. Staudinger-Gattermann's laboratory. Not particularly interesting.

BASEL—Prof. Bernoulli, Fichter. New physical chemistry institute with new features. Schönbein relics.

ZURICH—Profs. Henri, Treadwell, Debye, Scherrer, Fierz-David.

MUNICH—Profs. Wieland, Honigschmidt, Fajans, Vanino, Prandtl, Laboratory of Liebig, Baeyer, Willstätter. A busy institute in which first class work is done in organic, physical, rare earths and atomic weights. *Old South Cemetery*: Grave of Liebig, Fraunhofer. *Deutsches Museum*: Best (*Turn to next page*)

Prague the Polyglot

General Science

Reborn of the World War after generations of suppressed travail, Czechoslovakia is taking advantage of her new freedom to push forward very vigorously all departments of her national existence. Though there are a number of cities in the country which might repay a visit, the American on his European travels is likely to have time only for Prague, famous for a picturesque beauty uniquely its own.

The university situation in Prague is complicated by the fact that it is a bilingual city, due to the presence of many German-speaking inhabitants among the Czechs. This necessitates a double system of education, such as is found in some parts of Canada.

Museums in Prague include the National Museum, the Czechoslovak Ethnographical Museum, the Museum of the Anatomical Institute and a number of others.

One other spot in Czechoslovakia will be a place of pilgrimage for scientists; for biologists, and especially for geneticists, it is a Bethlehem that far outshines the capital. This is Brno, known before the

War as Brünn. It was here in the garden of the Augustinian monastery that Gregor Mendel raised his peas, and it was before the modest local scientific society that he read the two small papers which, years after his death, weighed more than all the ponderous volumes on heredity that existed before the opening of the present century.

Science News-Letter, April 7, 1928

Budapest

General Science

The visitor to Budapest will find its University well filled and hard at work, and the various agricultural and technical schools in like condition. Among the museums he will want to visit at least the Agricultural and the Silvicultural; also the Geological Institute, the Institute of Meteorology and Terrestrial Magnetism and the National Chemical Institute and Central Experiment Station. A special institute for the investigation of the properties and uses of the Eötvös torsion balance has existed at Budapest since 1907.

Science News-Letter, April 7, 1928

Chemistry—Continued

technological and scientific museum in existence. Fine in chemistry, an educational feature of the first importance. *Museum of Academy of Science*: Excellent for mineralogy and zoology.

JENA—The Schott & Genossen glass factory and the Zeiss works are worth while.

LEIPSIK—Profs. Hantzsch, Paal, Rassow. Laboratories of Kolbe, Wislicenus. *Physikalisch - Chemisches Institut*: Ostwald's laboratory. Profs. LeBlanc, Böttger, Drucker, Wolfgang Ostwald.

DRESDEN—Profs. Foerster, Lottermoser. Newest laboratory in Germany and well worth a visit. *Photographic Institute*: Prof. Luther.

BERLIN—Profs. Schlenk, Paneth, Pringsheim, etc. Emil Fischer's laboratory. Largely remodeled. *Physikalisch-Chemisches Institut*: Prof. Bodenstein. *Kaiser Wilhelm Institute*: Prof. Freundlich, Stock, Hahn, Haber, etc. Research laboratories of greatest interest. *Reichsanstalt*: Corresponds to Bureau of Standards. *Technische Hochschule*: Prof. Hofmann. *Prussian State Library*: Darmstaedter Dokumenten Sammlung. Greatest collection of

scientific manuscripts and letters in existence. *Hofmann Haus*: Library of German Chemical Society. Home of *Chemisches Zentralblatt*, Beilstein etc.

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Volcanoes—Continued

from Milazzo to the little town of Lipari (Hotel Faranna, modest but decent). One visits Vulcano (always in a solfataric state) by row boat from Lipari (about one hour). For Stromboli one must take the steamboat and spend the night, or two, at San Vincenzo (no hotel, but can easily get a room). It takes about two hours to climb to the crater—a splendid sight, if it is going right.

OTHER VOLCANOES—Then there are the extinct volcanoes of the Alban Hills, (near Rome), the crater lakes of Bracciano, Lago di Bolsena (near Orvieto) and that near Viterbo (Vico). Viterbo is a wonderful old city in itself—quite apart from volcanoes. So is Orvieto, with its splendid cathedral.

Science News-Letter, April 7, 1928

Uses of the Useless

Botany

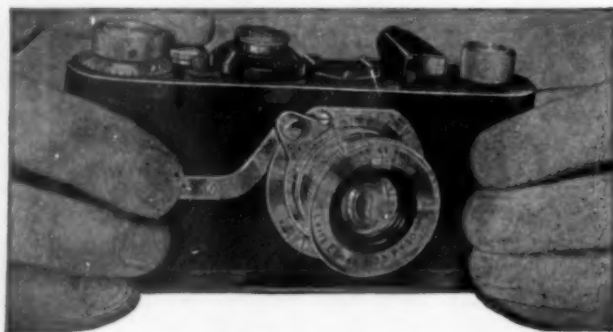
RAYMOND J. POOL AND ARTHUR T. EVANS, in *First Course in Botany* (Ginn):

Possibly one may wonder whether or not weeds can be valuable. In a few cases they are definitely of some worth. In cut-over areas where forests have been removed, weeds develop rapidly and are a great factor in the prevention of erosion. Soils may thus be held until a new succession is established on the area. It is largely because of weeds that plant successions do not at once return to the lowest type when a forest is removed.

Weeds are also of value in abandoned fields, where they prevent the drifting of soils by the action of the wind. Their utilization of water in such places is of little consequence, since no other crop is being grown. They perform another function in plowed fields: together with volunteer crop plants acting as weeds, they hold snow, thereby raising the moisture content and adding humus to the soil. Drifting snow is held in large banks over edges of fields near fence rows where weeds have grown unrestricted and is of some advantage. However, this is scarcely an argument in favor of such a shiftless practice as allowing fence rows to grow up to weeds, for the damage caused by weeds in the adjacent fields the following summer probably more than counter-balances the good that comes from the parent plants holding snow in the fields or fence rows.

Science News-Letter, April 7, 1928

Three-fourths of the earthquakes are upheavals under the sea.

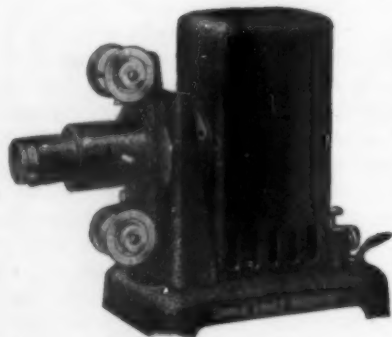


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Chemical Days in Paris

Chemistry

A list of places of interest to a chemist in Paris. Compiled by Dr. Atherton Seidell of the Hygienic Laboratory, who has conducted researches at the Pasteur Institute.

PASTEUR INSTITUTE, 25 and 28 Rue Dutot. The street on which this great institution is located begins near the intersection of the Boulevard Pasteur and the Rue Vaugirard. The Pasteur station of the Metro and the Nord Sud is located at this point.

The tomb of Pasteur, which is under the entrance stairs of the main building, is regularly open to visitors only on certain Saturday afternoons, but scientists who apply to the Concierge will be shown the tomb, the library, the rabies treatment rooms and the principal laboratories at almost any hour of the day. In the gate house at No. 28 resides Joseph Meister, who as a child of seven years was the first person to be treated by Pasteur for rabies. In the garden there is a statue to Jupille, the shepherd boy, who was the second one to receive the Pasteur treatment. A small tip is usually given the attendant for his trouble in showing visitors around.

The chemical biological laboratory of M. Gabriel Bertrand and the therapeutical chemical laboratory of M. Ernest Fourneau are located in

the building at No. 28 Rue Dutot. These and all the laboratories of the Pasteur Institute are open even during the summer vacation months.

THE SORBONNE is located on the Rue des Écoles at the corner of Rue Saint Jacques. The great hall in this is of especial interest.

THE COLLEGE DE FRANCE is just across the Rue Saint Jacques from the Sorbonne. Here is the laboratory of Berthelot which is now under the direction of M. Charles Moureu. In front of the building there are statues of Claude and of Berthelot.

THE INSTITUTE OF RADIUM is on the Rue Pierre Curie which begins at the Rue Saint Jacques a short distance beyond the Sorbonne.

THE INSTITUTE OF APPLIED CHEMISTRY adjoins the Radium Institute and the new Biological Institute for which a donation from the Rothschilds was recently received is being erected in the same grounds.

THE SCHOOL OF PHARMACY in which are located the laboratories of M. Behal, Delepine, Lormand and many other well known chemists is at No. 4 Ave de l'Observatoire which begins at the upper end of the Luxembourg Gardens.

THE CHEMICAL SOCIETY OF FRANCE head- (Turn to next page)

Roman Rambles

General Science

The scientific man need not feel lost in Rome merely because the older concerns of humanity bulk larger by comparison than they do in cities of civilizations to the north. In the Eternal City, what *Is* lives alongside of what *Was*. The University, which dates back to 1303, has its museums, its exhibits, its collections, its laboratories, in all the modern sciences. There is a very adequate zoological garden. And there are museums of all kinds and sizes: National, the Prehistoric and Ethnographic, the Engineering Institute's, etc. Archaeology naturally comes in for heavy attention, with the *Museo Nazionale Tarquinense*, the *Museo Nazionale di Villa Giulia*, the *Museo Nazionale di Castel S. Angelo*, the *Antiquarium Comunale*, not to mention the obvious unescapables like the Forum and the Colosseum. One of the lesser known institutes which may interest Americans is the *Istituto Cristoforo Colombo*, devoted to the cultural and economic ties between the countries of the western Mediterranean region and Latin America. Of an importance not to be overlooked is the *Accademia Nazionale dei Lincei*, the National Academy of Sciences of Italy, oldest society of its kind in the world. Rome also is headquarters for the International Institute of Agriculture, which is participated in by 71 countries.

A matter of pride for all Americans is the adoption of American library methods in the rearrangement of the Vatican Library. This collection of books and manuscripts is so vast that nobody really knows how many volumes it contains; half a million is a rough estimate.

Science News-Letter, April 7, 1928

Alpine Geology

Geology

A little geology will make the Alps more beautiful and more attractive. Only a detailed book, such as "The Structure of the Alps" by Prof. Leon W. Collet, of the University of Geneva (London: Edward Arnold and Co.) just published can adequately satisfy the visitor to Switzerland who desires to see geological features as well as scenery. The geological guides of the Swiss Alpine Club should not be missed if any extensive expeditions are to be taken.

Science News-Letter, April 7, 1928

The Viennese Tradition

General Science

When the old Austro-Hungarian Empire was rent in pieces by the War, and Vienna left stranded in a mere rag of her former share of the map, there was much shaking of heads and prophesying of the death of the city. It seemed incredible that such a metropolis could be maintained on so small a foundation. Hard times indeed did come, but the end of the first post-war decade sees them considerably ameliorated, with the Viennese carrying on right bravely. They have always been cheerful, these Austrians, and the cheerful man is usually a courageous one. Vienna will yet be redeemed, and her own people will be mainly to thank for her redemption.

So we find today all the great array of literary, artistic and learned institutions maintaining the great tradition, and it is well worth the scientific traveler's time to visit those work-places that give Vienna the right to contend with Paris for the proud title of "the most civilized city in the world."

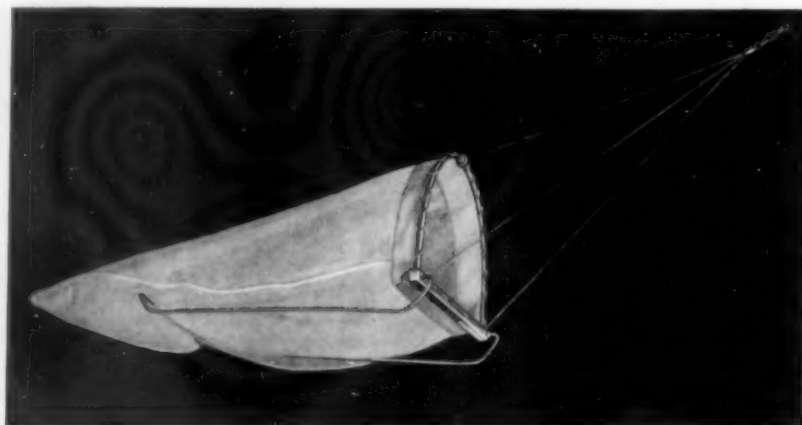
First of all, of course, comes the great University, famous the world over not only for its academic accomplishments but for the literal miracles of surgery that have been performed in its clinics. Accordingly, the clinics and the medical, pathological, and anatomical museums of the University will be sought by all who profess the craft of Æsculapius, either as an art or as a science.

But other scientists will not be left without occupation in Vienna. The Botanic Garden, with its associated Museum, is a veritable paradise for the botanist; the garden contains 100,000 living specimens, the herbarium 1,000,000 pressed ones. Then there are institutes of plant physiology, pharmacology, paleontology, geology, mineralogy, geography, anthropology—the list might be continued indefinitely.

Vienna is a city of museums. For the scientific visitor the greatest will be the Natural History Museum. But the Geological (Turn to next page)

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Chemical Paris—Cont.

quarters, library and assembly hall are located at No. 44 Rue de Rennes which is at the Place Saint Germain de Pres.

THE SOCIETY OF CHEMICAL INDUSTRY headquarters is at No. 49 Rue des Mathurins. Here is also the office of the Secretary of the International Union of Pure and Applied Chemistry, M. Jean Gerard.

LA MAISON DE LA CHIMIE for the construction of which nearly one million dollars has been subscribed by some 50 nations, will be erected at the intersection of the Ave de President Wilson and the Ave d'Jena. At this point there is a beautiful equestrian statue of George Washington and on the opposite side of the Ave d'Jena from the site of the future Maison de la Chimie is the magnificent new embassy of the United States.

LAVOISIER'S STATUE will be found immediately in the rear of the Madeleine. The statue of *Chevereul* is near the Museum of Natural History in the Jardin de Plantes.

THE AMERICAN UNIVERSITY UNION is at No. 153 Boulevard Saint Germain. Here will be found reception and reading rooms and an organization designed to furnish all information which may be needed by American students or scientists coming to Paris for a longer or shorter period.

Science News-Letter, April 7, 1928

Vienna—Continued

Museum, the Technological Museum Vindobonense and a number of others can not well be neglected if one's time permits. Dr. Pezibram's microbiological collection demands at least a few hours of the biologist's stay. One unique museum is that devoted to the evolution of the watch- and clock-maker's art; it has some 10,000 specimens of time-measuring machinery, dating from the very earliest times down to the present.

Science News-Letter, April 7, 1928

Radium gives off three kinds of rays: Alpha rays, or rapidly moving atoms of helium; beta rays, the "atoms" of electricity, and gamma rays, similar to X-rays.

At the present rate of the chestnut blight's spread, it is predicted that the blight will kill most of the chestnut timber in the southern Appalachian region in the next ten years.

German Chemistry

Chemistry

Great chemical progress is being made in Germany and the laboratories and plants where the new processes for obtaining oil from coal, making synthetic methanol, dyestuffs, rayon, artificial fertilizers, and a multitude of other products will be of great interest to the chemist traveler. Many of the great German chemical plants can be visited; school children are conducted on tours through many of them in order to foster the chemical spirit.

Chemical progress in the country beyond the Rhine is detailed in a trade information bulletin of the Bureau of Foreign and Domestic Commerce, Washington, D. C., "German Chemical Developments in 1927" by William T. Daugherty, American Trade Commissioner in Berlin. Complete lists of important plants are contained in this publication.

The outstanding chemical development in Germany is the Leunawerke, at *Merseburg*, operated by the Ammoniakwerk Merseburg G. m. b. H., which is controlled by the German Dye Trust (I. G.). Around 350,000 tons of synthetic nitrogen are produced there annually. The making of oil from coal and lignite by the Bergius process has progressed so far that 100,000 tons of synthetic gasoline will go on the market this year. Synthetic methanol is also produced from carbon monoxide and hydrogen by catalytic methods.

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Haunts of Cave-Men

Anthropology

Information from Dr. George Grant MacCurdy, director, American School of Prehistoric Research. (Home address: Peabody Museum, Yale University.)

From certain locations in Europe there have come evidences of the great antiquity of man. Tourists can see for themselves some of these diggings from which anthropologists are still unearthing the skeletons, implements and other evidences of ancient men. Dr. MacCurdy is director of the American School of Prehistoric Research which will be digging at Castel-Merle during the month of August. Dr. MacCurdy's address while there will be Hotel Delsaut, St. Léon-sur-Vézère (Dordogne), France.

A full list of the prehistoric sites of Europe is contained in Dr. MacCurdy's two-volume work, "Human Origins," but the following is a brief list of the accessible sites in France: (Turn to next page)

Science in London

General Science

As might be expected, London, the world's largest city, contains so many things of interest, that a stay far longer than the average American visitor can make, would be required to see them all. This is also true of the places interesting to the scientist, but the following list gives a few of the places that it is most essential to visit. The Royal Observatory, and Burlington House, the home of the Royal Society and the Royal Astronomical Society, are mentioned in the article on astronomy.

THE BRITISH MUSEUM, on Great Russell Street, and adjacent to Russell Square, is probably the world's most famous museum. Its library contains over four million volumes, on more than fifty miles of shelving. The archaeological exhibits, which include the famous Rosetta stone, with the aid of which the Egyptian hieroglyphics were first deciphered, are of particular interest. Experienced guides, inexpensive handbooks, catalogs and postcards all aid the visitor to make the best use of his visit.

THE ROYAL INSTITUTION is on Albemarle Street, just off Piccadilly. It is the scene of the researches and popular lectures of some of the greatest British physicists, from Thomas

Young, Humphry Davy and Michael Faraday down to Sir Joseph Thomson, Sir Ernest Rutherford and Sir William Bragg. During the winter months popular lectures are given, of which the Christmas "Children's Lectures," so-called because they are mostly attended by adults, have achieved international fame. The historic lecture hall, the library and the museum, including the original miner's safety lamp and other apparatus made and used by Davy, Faraday and others, will be of interest to the American visitor who comes in the summer time.

THE DAVY-FARADAY RESEARCH LABORATORY, next door, is affiliated with the Royal Institution, and provides research facilities for qualified investigators.

LANDDOWNE HOUSE is on the south side of Berkeley Square, not far from Burlington House and the Royal Institution. There is nothing here of present interest to the scientist, but the spot is immortal in scientific history, because it was while Joseph Priestley was serving here as librarian that he discovered oxygen.

THE SCIENCE MUSEUM at *South Kensington* is quickly reached by the London "Un- (Turn to next page)

Russia Sees It Through

General Science

Although official relations between the government of Russia and the governments of the Western Powers continue to be for the most part of the stiffest and coldest, individual scientists from the *Abendland* find themselves warmly welcomed by their colleagues when they visit Russia, and Russian scientists are appearing with increasing frequency at international scientific congresses.

Russian scientists, indeed, have been steadily forging to the front since the War. They are giving the rest of the world a stiff race for first place in the field of soil science, and in plant physiology they have made a number of important contributions. The Soviets are also engaged in finding out something about the vast territory under their flag, and frequent expeditions have been going into Russian Asia to inquire into such things as geography, geology, mineral and petroleum resources and the hitherto neglected paleontology and archaeology of Central and Farther Asia.

The two great cultural centers in Russia which American travelers are likely to visit are Leningrad and Moscow. At Leningrad there is, of course, the University, which is now said to be carrying on vigorously with a full student body. Then there is the National Museum, and of perhaps even greater interest the Hermitage, once the private museum of the Czars, now public. For the botanist there is the great Botanic Garden, and for the plant physiologist the Institute of Applied Botany.

At Moscow again there is the University, with its chain of museums, institutes, collections, etc. As might be expected at the capital, there are many governmental scientific agencies, and a large number of medical and hygienic centers under government direction, as well as the peculiarly Soviet educational institutions designed to carry out the ambitious program of wholesale adult education of Russia's formerly illiterate masses.

Science News-Letter, April 7, 1928

Science in London—Continued

derground." Probably of chief interest to the American visitor this year will be the original Wright airplane with which the historic flights at Kitty Hawk were made, and about which there has been so much controversy. This is now on display, but it is by no means the only thing of interest, however, for in a complete tour of the Museum, which might well occupy several days, one can see all sorts of interesting examples of early machinery, scientific instruments, ship models, models of mines, etc., radio and other means of communication; in short, something representative of every conceivable branch of physical science or industry. As the exhibits are grouped by subjects, the visitor whose time is limited would do well to concentrate upon the sections in which he is most interested, with the aid of the sectional guides sold at the entrance for a nominal sum. Frequent lecture tours, lasting for an hour or so and under the direction of an experienced guide, cover individual subjects and their development, as shown by the exhibits.

THE NATURAL HISTORY MUSEUM, also at *South Kensington*, adjoins the Science Museum. It is a branch of the British Museum, and contains one of the world's finest collections of birds, beasts and plants of ancient and modern times. The central hall, which the visitor first enters, reveals an epitome of the entire museum. Like any similar museum, these form a text-book of evolution. A summary guide book of the entire museum, as well as subject guides to the different departments, and colored picture post-cards of some of the more striking exhibits are on sale at the entrance. Experienced lecturers conduct tours of the museum twice a day.

VICTORIA AND ALBERT MUSEUM, also at *South Kensington*, and close to the Science and Natural History Museums, is not of such immediate interest to the scientist as the latter two. In its mile or more of exhibits, however, are objects to illustrate the arts and crafts of various countries and periods.

Science News-Letter, April 7, 1928



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Cave-Men—Continued

OLD STONE AGE

REGION OF LES EYZIES (Dordogne): Cap Blanc, La Grèze, Combarelles, Crô-Magnon, Font-de-Gaume, La Mouthe, Laugerie-Haute, Laugerie-Basse, Gorge d'Enfer, Le Moustier, and Castel-Merle.

NIAUX, cavern near Tarascon (Ariège).

MAS D'AZIL (Ariège), two sites in a subterranean gallery near the village of Mas d'Azil.

GARGAS, cave in the commune of Aventignan (Hautes-Pyrénées).

LA QUINA, rock shelter in the commune of Gardes, in charge of Dr. Henri-Martin at Le Peyrat (Charente).

SOLUTRE in the commune of Solutré near Macon (Saône-et-Loire).

NEW STONE AND BRONZE AGES

(1) Region of Carnac (Morbihan). Many megalithic monuments.

Science News-Letter, April 7, 1928

Europe's Botanical Gardens

Botany

Information from Dr. Marshall A. Howe, acting director of the New York Botanical Garden.

Kew, ENGLAND—ROYAL BOTANIC GARDENS at Kew, Surrey, England, were formerly gardens of the palaces of the Royal Family of England. They cover about 260 acres. The displays under glass are of especial popular interest. The institution has a great herbarium and botanical library. The research work is chiefly economic and taxonomic. About the Royal Gardens of Kew center 24 or more botanical gardens of the British Colonies, chiefly manned by those who have studied or worked at Kew.

BERLIN—THE BOTANICAL GARDEN OF BERLIN was removed to the suburb known as Dahlem in 1909. It is famous for its arrangement of plants in geographic and ecologic associations. It has a large library and herbarium and has published much scientific work.

PARIS—THE JARDIN DES PLANTES is in the heart of the city of Paris, near the Muséum d'Histoire Naturelle, and includes some famous specimens of trees.

JAVA — BUITENZORG, JAVA, has claimed the largest area of any botanical garden, occupying some 1,100 acres at an altitude of about 6,000 feet. It includes extensive collections of tropical plants and is one of the most important botanical institutions of the world.

Science News-Letter, April 7, 1928

Abandoned Scenes of Ancient History

Archaeology

The remains of ancient civilizations are one of the features of Europe and the Mediterranean region most interesting to the scientifically inclined traveler. Some of the outstanding archaeological ruins are listed below:

ENGLAND—Hadrian's Wall: Most of the course of this 73-mile wall can be traced and there are numerous ruins of the forts, castles, and watch towers which defended the important boundary line. **Stonehenge:** In Wiltshire County, the circle of giant monoliths used in primitive rites is one of the famous monuments of ancient Britain. **Silchester:** a completely excavated Roman town.

ISLAND OF GOTHLAND — Visby: "City of ruins and roses" with many objects from the bronze and iron ages, and medieval ruins as well.

FRANCE — Avignon and nearby places: Gallo-Roman ruins of once flourishing colonial cities.

SPAIN—Seville: At the suburb of Italica, birthplace of three Roman emperors, are the ruins of a Roman amphitheater and aqueduct. **Merida:** "The Rome of Spain," contains the

finest example of a Roman theater in this part of the Empire.

ITALY—Fiesole: Ruins of the old Etruscan civilization. **Verona:** Finely preserved Roman amphitheater. **Rome:** Focusing point for the old Roman Empire today, just as 2,000 years ago. The forum excavations now in progress are real "news" of ancient Rome. **Naples:** Pompeii and Herculaneum nearby.

SICILY—Taormina, Syracuse, and Girgenti: Greek architecture and the finest of Greek art in a setting of unusual beauty.

MALTA—Fine specimens of stone age temples and monuments.

GREECE—Delphi: All that is left of the shrine of the oracle, in its wild, impressive setting. **Olympia:** Where the famous Olympic games were instituted. **Athens:** Temples, stoas, arches, and other celebrated examples of the beauty of ancient Greece. **Old Corinth:** Recent excavations have added to the interest of this once wealthy city, revealing some of its treasures of sculpture, paintings, and fine architecture. **Epidaurus:** The most (Turn to next page)

The Planetarium Miracle

Astronomy

To see the stars visible from the north or south pole, or any place between; to see the stars as they appeared to the ancient Egyptians; or, perhaps, to see the celestial phenomena of an entire year take place before your eyes in seven seconds—such is the miracle now possible to visitors in Germany.

The instrument that makes this possible, the planetarium, is, with the exception of the greatest astronomical telescopes, the most complicated, the most expensive, and also, undoubtedly, the most ingenious optical instrument ever constructed. Certainly it is the finest aid to the study of the stars that the world has ever seen.

Since it was first demonstrated a few years ago, planetariums have been installed in numerous German cities, and in Vienna, but it is the one in Berlin that the average American visitor will probably find most convenient. Situated in the *Zoologischer Garten*, just opposite the station of the *Stadtbahn*, it is easily reached. Even if the visitor can not understand German easily, or get an interpreter to accompany him, the planetarium should not be missed. The constellations are the same to all languages.

Among the other cities where the planetarium can (Turn to next page)

The Baedeker of Bugs

Entomology

Information from Dr. L. O. Howard, for many years chief of the Bureau of Entomology, U. S. Department of Agriculture.

Entomologists who go abroad this summer would do well to have their trip over before August, or to postpone it until early autumn; for most of entomological Europe will be in America during that month, to attend the International Congress of Entomology at Ithaca, N. Y. It might well be a privilege worth waiting for, to attend this meeting and then to sail on the same ship with a few congenial transatlantic cronies in entomology.

Once ashore, there are plenty of places where the person interested in insects may find much to interest him—enough entomological shrines so that one might, if he wished, spend his whole summer on them, without seeing a single art gallery or cathedral or ruin.

From the point of view of the popular natural history of insects, perhaps the European entomological Mecca would be the home of J. Henri Fabre at *Serignan*, in the south of France. This has been made a national museum; it can be

reached by motor from *Arles* or *Avignon*.

A combination of popular and technical interest is offered by the new vivarium in the *Jardin des Plantes*, in *Paris*. Here, in the great garden that was the scene of the labors of many of France's most brilliant biologists, insects are kept in as nearly optimum surroundings as can be attained under a roof, and at the same time are made available for intimate observation by the visitor. Nor should the entomotourist omit the Museum of Natural History, on the *Rue de Buffon*. And he who spends part of his summer in the blessed land of Brittany must by all means see the Oberthur collection at *Rennes*.

In *London* one goes, of course, to the British Museum of Natural History in any case; its collections are among the most notable in the world. At *Oxford* is the famous Hope collection, of which J. O. Westwood was once curator. One of the strangest of combinations—butterflies and fleas—dominates the great Rothschild Museum collections at *Tring*. (Turn to next page)

Zoological Gardens

Zoology

Information from Dr. W. M. Mann, director of the National Zoological Park, Washington, D. C.

Mammals, birds, reptiles, amphibians, fishes and insects, strange to the country, can be found in most of the large cities of Europe. In many of the small cities there are creditable animal collections of great interest to the inhabitants.

Some of the interesting exhibits that would be well worth the scientific traveler's attention are:

LONDON: Specimen of *Takin*; wonderful new reptile house; Mappin Terraces, with mountain climbing animals; magnificent aquarium.

STELLINGEN near Hamburg: Open air panorama of African game animals.

JARDIN DES PLANTES, Paris: New vivarium with remarkable collection of insects and other invertebrates.

ROME: Five barless pits containing carnivores.

DUBLIN: Remarkable for the many lions bred in captivity.

EDINBURGH: Breeding penguins.

Science News-Letter, April 7, 1938

Planetarium—Continued

be seen are Jena, home of the great Carl Zeiss Optical Works, makers of the planetarium as well as of all sorts of other optical instruments, and which well repay a visit; Munich, at the *Deutsches Museum*, for which the first one was constructed; Barmen, Dresden, Leipzig, Düsseldorf, Hannover and Mannheim. At practically all of these an admission charge of one mark is made. A word of caution is in order regarding the Munich planetarium. The *Deutsches Museum* is the finest of all technical museums, and deserves a visit of at least several days. However, the planetarium there is an early type, lacking some of the refinements of the later models, and in a dome that has proven too small to show it to advantage. To fully appreciate what the instrument can do, one should see it as it is in Berlin or Jena.

The planetarium consists of 119 magic lanterns in one. These project the stars, the sun, the moon and the planets on the inside of a white cloth-lined dome, about 90 ft. in diameter, but so realistic is the effect that the visitor seems to be actually out of doors under the sky depicted.

Science News-Letter, April 7, 1928

A complete and up-to-date summary of progress in fields in which unusually rapid progress has been made during the last decade.

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Edited by EDWIN O. JORDAN and I. S. FALK

Written by eighty-two contributors

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Old World History—Continued

famous sanctuary of Aesculapius, god of healing; also the ruins of the best preserved theater in Greece. *Mycenae*: Ruins of the old fortress, and nearby, at Dendra, are the royal beehive tombs that have recently revealed remarkable possessions of long forgotten kings. *Sparta*: More famous Greek ruins.

CRETE—*Knossos*: The beautiful palace of Minos and other remains of the strange Cretan civilization.

ASIA MINOR—*Troy*: Nine layers of civilization, including the sixth city, which attained historic fame.

PALESTINE AND SYRIA—*Jerusalem*: Many sites and remains associated with Hebrew and Christian history and with Roman rule. *Byblos*: A crusader's castle and ancient temples. *Baalbek*: The massive, towering Temple of the Sun, the Temple of Bacchus, and other impressive ruins. *Palmyra*: Many ruins of many ages can be seen at this once important desert city.

EGYPT—*Gizeh*: The well known pyramids, and the sphinx, which has recently been dug out of the sand and can be completely seen for the first time in 1,700 years. *Sakkhara*: The step pyramid, oldest of the great pyramid tombs. Recent excavations led to the discovery of the tomb of

the famous royal architect Imhotep, and what is believed to be the tomb of King Zoser himself. *Valley of the Kings*: Particularly, of course the tomb of Tutankhamon. *Tell-el-Amarna*: The unfinished city built by the predecessor of Tutankhamon. *Abydos*: The great "Tomb of Osiris," shrine of the Egyptian god of immortality. *Luxor*: Temples and statues of Thebes, "the mysterious city," a great wealth of archaeological evidence from Egypt's civilization. *Philae*: Island sacred to Isis, containing beautiful temples.

NORTH AFRICA—*Timgad*: Extensive ruins of an African Roman colony. *Carthage*: One of the great sites of history, just beginning to be revealed through excavations at the precinct of Tanit.

Museums of archaeological interest include those at: London, Edinburgh, Oslo, Stockholm, Copenhagen, Brussels, Paris, Bordeaux, Madrid, Rome, Naples, Florence, Bologna, Delphi, Athens, Olympia, Candia, Alexandria, Cairo.

Science News-Letter, April 7, 1928

The United States had 91,000 forest fires in 1926, and the greatest cause was smokers, with sparks from railroads as the second cause.

Badeker of Bugs—Continued

In Belgium the best of the insects are in the Natural History Museum at *Brussels*. This museum is one of the most remarkable in the world. Built like a huge amphitheater, it offers to the first glance of the entering visitor a sweeping vista of everything that lives on this planet.

One does not commonly think of Spain as a leader in scientific work; yet at least one collection in the Natural History Museum at *Madrid* will repay a visit by the entomologically-minded visitor. This is the collection of grasshoppers and their allies, accumulated by Prof. Ignacio Bolivar. In Italy the two centers of insect interest are the Bezzi collections at the University of *Turin*, and the great Gestro collections, especially those of beetles, in the Natural History Museum in *Genoa*.

In what was once the Austro-Hungarian Empire the disturbances caused by the post-war breakup have subsided sufficiently to allow good work in entomology to be done again. The traveler will want to see the collections at the Zoological-Botanical Museum in *Vienna*, the very large post-war collections of Dr.

J. Obenberger at *Prague*, and the work that is going on under Drs. Szitady, Horvath, Kertysz and Moc-sary at the Natural History Museum in *Budapest*.

In Germany entomology, like all the other sciences, goes forward with a vim and energy indistinguishable from the pre-war days. The most accessible collections in *Berlin* are those at the Zoological Museum. For economic entomologists, great interest attaches to the work of Dr. Albrecht Haase on parasitic insects, at the laboratories of the Biologisches Reichsanstalt, *Berlin-Dahlem*. At *Dresden* there is a great collection of Lepidoptera at the Ethnologisches Museum, in charge of Dr. K. M. Heller. One of the finest exhibits to be found anywhere of the work of injurious insects is to be found in the Forest Institute at *Munich*.

Science News-Letter, April 7, 1928

A family in which the male tendency is so strong that in four generations there have been 35 sons and no daughters has been discovered in a California city.

The Astronomer in Europe

Astronomy

Prepared by James Stokley, largely from information gathered on personal travels.

With the world's largest telescopes located within the United States itself, as will be described in next week's American travel number of the SCIENCE NEWS-LETTER, some Americans are apt to forget that there are really important and interesting astronomical centers in Europe. But, it must be remembered, before there was any permanent settlement in America, European astronomers were gazing through telescopes at the heavens. And also, even in America, we measure our longitude from a telescope on the outskirts of London.

The points of astronomical interest in Europe to attract the scientific tourist are of two kinds. One includes the astronomical "shrines," places where some great worker of the past made great discoveries, or places where the relics of the scientific "saints" are preserved. Then there are the modern institutions, where research is being carried out. Of course, in some instances, the two coincide, as at the Royal Observatory at Greenwich, where the original Flamsteed House still stands as part of the present day observatory.

Probably the most complete tour of European astronomical centers that has been made was that of Mr. David B. Pickering, president of the American Association of Variable Star Observers. He has made two recent trips to Europe, on which he has visited practically all the points of greatest astronomical interest. His travels are described in a series of illustrated articles that has been appearing in *Popular Astronomy* at irregular intervals under the general title of "The Astronomical Fraternity of the World." No intending astronomical traveler should possibly fail to look up and read these articles.

ASTRONOMICAL SHRINES

Starting in *England*, the most important "shrines" are probably those associated with the immortal name of Isaac Newton. These are scattered in various places, and the visitor does not need to leave *London* to see some of them. At Burlington House, on Piccadilly, is located the headquarters of the Royal Society, most famous of all learned bodies. In their library one can see such Newton relics as the original

manuscript of the *Principia*, the original reflecting telescope, only a few inches long, which he made at Cambridge and submitted to the Society in 1672, numerous Newton letters and other writings and a famous contemporary portrait. In another part of the same building, across a court, is the headquarters of the Royal Astronomical Society. Here is a piece of the apple tree that stood in Newton's orchard, and under which he doubtless often sat in cogitation, though he may or may not have observed the apple falling from it that has been said by Voltaire to have given him the idea of gravitation.

Leaving *London*, one can go to *Grantham*, in Lincolnshire, where the young Newton went to school, and where there can still be seen the initials I. N. that he carved on a window frame as a boyish prank. About 6 miles away is *Woolsthorpe*, where he was born. Visiting *Cambridge*, at Trinity College, there can be seen mementoes of Newton's college days, and his life as Lucasian professor.

His tomb is situated in a prominent place in Westminster Abbey, *London*.

Next to Newton, the greatest name in English astronomical history is probably that of Sir William Herschel, who really made the first of the great reflecting telescopes, instruments that even today would be rated as large. Following his discharge from the Hanoverian Army, he went to England as a musician. Settling in *Slough*, in Bucks, he soon became interested in astronomy and made his own instruments, which he used with the help of his sister, Caroline. His house is still standing, it is still occupied by his descendants, and is filled with relics of Sir William's occupancy, including many of his actual instruments, and pieces of his greatest telescopes. A complete description of the relics was given in the "Transactions of the Optical Society," Vol. XXVI, No. 4, published in 1924. This was written by Dr. W. H. Steavenson, whose work has done considerable to save them from neglect.

The Flamsteed House, the oldest part of the Royal Observatory at *Greenwich*, should be seen by the visitor to *London*. Frequent trains from Charing Cross station take you to the entrance of Greenwich Park,

in the center of which is the observatory. This is shown on our cover illustration. It was built by Flamsteed, first Astronomer Royal, in 1675, partly from funds provided by the government of Charles II, from the "sale of spoiled gunpowder," the plans being made by the famous architect of St. Paul's and other prominent London structures, Sir Christopher Wren. In the "Octagon Room" in this part of the observatory are numerous old astronomical instruments, including John Harrison's original chronometer, the invention of which made modern navigation possible.

Crossing to the continent, the *Paris* Observatory attracts attention. Situated at the end of the *Avenue de l'Observatoire*, which, at its other end, terminates at the *Jardin de Luxembourg*. Like Greenwich, the Paris Observatory is an old structure with recent additions, notably the two telescope domes on the roof. Entering the gate, the visitor first sees the statue of Le Verrier, co-discoverer with the Englishman, Adams, of the planet Neptune. Beyond is the main building, of even greater antiquity than Flamsteed House, for it dates back to the reign of Louis XIV, under whose direction it was started in 1667 and completed in 1671. Inside are rooms probably of very much the same appearance as they had in those days. Old and historic astronomical instruments are on exhibition.

In *Italy* can be found various reminders of Galileo. In the Museum of Physics and Natural History at *Florence*, near the *Pitti Galery*, is the *Tribuna di Galileo*, where the visitor can see two of his telescopes, as well as the actual lens of his "old discoverer," with which the satellites of Jupiter were discovered.

Many other relics of this great astronomer are shown in this museum, including, strange to say, his left index finger! Galileo's tomb, marked by an appropriate monument, is also in *Florence*, at the Church of Santa Croce.

Traveling north to Germany, *Bonn* is of interest because of the little three-inch telescope of Argelander's, preserved at the observatory. It was with this little instrument that he made the observations for the great *Bonn Durchmusterung* (1852-1859), still the fundamental star catalog. (Turn to next page)

THE ASTRONOMER IN EUROPE—Continued

The original cards on which he made pencil notes in its preparation are also still preserved.

Still farther north, in *Sweden*, at *Copenhagen*, one finds an observatory that antedates Paris and Greenwich, though it has not been used as an observatory since 1861. It has the form of a round tower, which was completed in 1642 by King Christian IV of Denmark, and visitors can still ascend to the top. An illustrated description of it is given by Professor Florian Cajori in the April (1928) issue of the *Scientific Monthly*.

THE MODERN OBSERVATORIES

Just as the modern world measures longitude from the *Greenwich* Observatory, so shall we start our description of present-day observatories with that institution. In the largest dome, a bulging affair, which gives it a curiously oriental aspect, is the 28 inch Grubb refractor, largest refracting telescope in England. But the instrument of perhaps greatest significance here is in a lower building, almost under the great dome.

Beneath a slit capable of opening from north to south is the meridian circle, or transit instrument—the official time teller of the British Empire, and the marker of the meridian of 0° longitude. Standing in front of this, or on the line marking the meridian outside the observatory wall, one can enjoy the unique privilege of having one hand on the eastern side of the world, and one on the western!

At *Cambridge* University are two important observatories in close juxtaposition at a spot a mile or so out of the center of the town. One is the University Observatory, now chiefly famous because it is here that its director, Prof. A. S. Eddington, and one of the world's leading astronomers, is engaged in his important researches. An interesting telescope seen here is the Sheepshanks instrument, in which a mirror reflects the star image up to a lens 12 inches in diameter. The observer sits in a small room, constantly looking down. At the Solar Physics Observatory, on the same grounds, is a telescope with a lens of 24 inches aperture.

Oxford, likewise, boasts two observatories, the University, and the Radcliffe. A photographic telescope of 24 inches aperture is the largest instrument.

At *Paris* the most important observatory is the National Observatory, already partly described because of its historic interest. Here one also finds a number of more modern instruments. These include a reflector of 47 inches aperture, the equatorial coudé, another type of telescope that enables the observer to sit in a small room and look down at the stars, with a 24 inch lens, and many smaller telescopes. Partly because of the poor atmospheric conditions at Paris, these instruments have only been used occasionally in recent years, and many of them have been allowed to fall into disrepair.

A short distance from Paris, easily reached by train from the *Gare Montparnasse*, or by the electric trains from the *Gare des Invalides*, is *Meudon*, the chief center of French astronomy. The observatory here is now operated as a branch of the one at Paris, and boasts the largest refractor outside the United States, with a lens of 32 inches aperture.

It is in *Germany*, however, that the American visitor, familiar with our own well equipped institutions, will find himself most at home. For completeness of equipment, for all branches of astronomy, probably no other observatories, even in the United States, can equal those of *Hamburg* and *Berlin*. The former is the *Hamburger Sternwarte*, located at *Bergedorf*, on the margin of the city and close to the Prussian border. A 40 inch reflector, a 24 inch refractor, a triple photographic telescope, smaller instruments, transit circles, measuring engines, accurate clocks, and other appurtenances of a well equipped observatory, all in perfect mechanical condition and in continual use, gladden the astronomer's heart!

The observatory of the University of *Berlin*, at *Neubabelsberg*, one of the city's fashionable suburbs, is reached by the *Stadtbahn*, and has even larger instruments than *Hamburg*. A 48 inch reflector here is the largest telescope in Germany, or, for that matter, in Europe. There is also a 24 inch refractor, several smaller telescopes, including several for photographic purposes. As at *Hamburg*, all of these are in the finest mechanical condition, a state of affairs that seems to be typical of German observatories. This observatory, which is operated jointly by the University and the Prussian

Government, also provides standard time for Prussia.

Near *Neubabelsberg*, two stations beyond, and at a terminal of the *Stadtbahn*, in *Potsdam*. Here one not only finds the former imperial palace that all tourists visit, but also the Astrophysical Observatory, with its great double-barrelled equatorial refractor. A 31 inch photographic telescope and a 20 inch visual one are mounted side by side. Also at *Potsdam*, though with its own director, is the Einstein Tower, a curious looking structure of concrete which is a tower telescope for solar and stellar observations, especially with the spectroscope, and also a laboratory for physical experiments along related lines. It was especially intended to test some aspects of the relativity theory, hence its name.

At *Berlin* one also makes the acquaintance of a type of observatory that is common in central Europe. This is the strictly popular observatory, that carries on no research, but exists solely for the important work of instructing the laymen in the mysteries of the stars. The one at *Berlin* is the *Treptow* Observatory. Here one finds an interesting astronomical museum, frequent illustrated lectures on astronomy, and the chance of looking at the heavens through a 24 inch telescope especially designed for popular use by the director, Dr. Archenold. A small admission charge is made to visitors.

Also in *Berlin* is the planetarium, described in detail in another article.

In other European countries the observatories are not so likely to be visited, though many of them are of great importance. At *Vienna* is the University Observatory, with its great 27 inch refracting telescope. In *Vienna*, also, there is a *Urania* Observatory, for the people, and a planetarium.

In *Italy* there is the *Merate* Observatory, about 20 miles northeast of *Milan*, where a 40 inch reflecting telescope has just been completed. This is the largest telescope in Italy. The Royal Observatory at *Rome* is important for its researches, especially those on the diameter of the sun. Also in *Rome* is the Vatican Observatory, operated for many years under the direction of Father J. C. Hagen, S. J., formerly of Georgetown University, Washington, and the leading authority of the world on variable stars.